REMARKS

Claims 1-20 are all the claims pending in the application. Claims 3, 10-14, and 17 stand rejected under 35 USC 112, second paragraph. Claims 1-20 stand rejected on prior art grounds. Applicants respectfully traverse these rejections based on the following discussion.

I. The 35 U.S.C. §112, Second Paragraph, Rejection

Claims 3, 10-14, and 17 stand rejected under 35 U.S.C. §112, second paragraph. In response thereto, Applicants' note that the transition "comprising" is used when defining the slightly conducting film in the claims. The phrase "comprising" indicates that the film includes, as part of its constitution, insulators (and not that is "consists only of" insulators). See MPEP §2111.03. The invention changes an otherwise insulating film into a slightly conducting film using carbon. Therefore, defining that the slightly conducting film "comprises" some insulating substances is not contradictory. Further, because of the more explicit recitation regarding the actual resistivity of the film, which defines the level of electrical conduction provided thereby, the term "conductive" has been removed from the claims and replaced with the language "provides a level of conductivity corresponding to a resistivity between 10^4 and 10^{11} ohms-cm", further rendering this rejection moot. The Office has argued previously that even insulators have some level of conductivity and, therefore, the modification of the claims to define the conductivity in terms of resistance values should remove any vagueness or ambiguity as to the level of conductivity and whether insulators can make up a part of this layer. In view of the foregoing, the Examiner is respectfully requested to reconsider and withdraw this rejection.

II. The Prior Art Rejections

Claims 1-3, 5, 7, 15-17 and 19 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Yasukawa (6,344,888) in view of Grinberg et al., hereinafter "Grinberg" (4,826,293. Claims 8-10, 12, and 14 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Yasukawa and Grinberg, further in view of Howe (4,640,744). Claims 4, 11, and 18 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Yasukawa, Grinberg, and Howe in view of Hanihara (5,990,988). Claims 6, 13, and 20 stand similarly rejected further in view of Admitted Prior Art (APA). Applicants respectfully traverse these rejections based on the following discussion.

A. The Rejection Based on Yasukawa and Grinberg

Before addressing the individual prior art rejections, Applicant's note that the Office Action fails to set forth a prima facia case of obviousness. Therefore, all rejections are defective and should be withdrawn. Generally, the fact that the references teach away from the claimed invention, the lack of any objective motivation to combine references, and the large number of references demonstrates that a prima facia case of obviousness has not been set forth.

More specifically, the primary reference Yasukawa requires that an insulator (silicon oxide) be positioned as a passivating layer next to the electrodes. This teaches away from the claimed invention that defines a carbon-containing layer that "provides a level of conductivity corresponding to a resistivity between 10^4 and 10^{11} ohms-cm." Clearly, by requiring that an insulator be positioned adjacent the liquid crystal material, Yasukawa teaches directly away from the claimed invention which utilizes a slightly conducting layer adjacent the liquid crystal material. Any modification of Yasukawa to require a different teaching would fail to set forth a prima facia case of obviousness.

Further, Yasukawa does not teach or suggest the use of a carbon-containing or diamond-like conductive film adjacent one or both of the electrodes in a reflective LCD device, as in the claimed invention. To the contrary, Yasukawa requires that an insulator (silicon oxide) be positioned as a passivating layer next to the electrodes. Here, the

claims clearly define a carbon-containing layer that "provides a level of conductivity corresponding to a resistivity between 10^4 and 10^{11} ohms-cm." Silicon dioxide is an insulator, unless modified (as with carbon) so that it changes its insulating characteristics. There is no teaching in the prior art of record of altering the silicon oxide insulator in Yasukawa to include carbon or in any other way to become a slightly conducting film. Yasukawa explicitly uses the silicon dioxide layer 17 as an insulator and calls the layer a "passivating layer." Yasukawa uses silicon oxide to prevent significant change in reflectance due to the variation of film thickness and wavelength of light.

Grinberg describes a method of making electron beam addressed LCD with a partially conducting material to absorb the electrons from the electron beam to control the voltage across the liquid crystal. The function of the partially conducting material in Grinberg is to absorb electrons and low the resistivity of the electrode at the location where the e-beam is to shine makes the composite electrodes conductive and turns on the pixel. This layer is part of the electrodes and not in contact with liquid crystal. There is no teaching or suggestion that this layer should be used adjacent the liquid crystal. In addition, the layer 10 or 10a in the Grinberg is clearly described as a passivation layer and is defined to be an "insulating film" in column 3 line 55. Further, Grinberg utilizes this layer as an insulator and describes that the resistivity should be between 10^9 and 10^{11} ohms-cm. To the contrary, the inventive layer has a much more conductive range of resistivity between 10^4 and 10^{11} ohms-cm. While there is some overlap between the two ranges, the use and positioning of the layer in Grinberg clearly demonstrates that it is an insulator and the higher range of resistivity confirms that it is an insulator. To the contrary, the claimed structure is defined as a slight conductor and has resistivity in the range of a slight conductor. Therefore, not only does Grinberg fail to teach a slight conductor in the position defined by the claims, Grinberg clearly defines and describes its layer as an insulator. Therefore, no teaching in Grinberg would lead one ordinarily skilled in the art to substitute a conductor in place of the insulator layer 17 of Yasukawa.

The issue of importance in this situation is not whether the specific measure of resistivity (for example, 10^9 ohms-cm) is definitely a "slight conductor" or "insulator", but instead whether the teachings of Grinberg would cause one ordinarily skilled in the art to modify the insulator layer 17 of Yasukawa in such a manner so as to make the

insulator layer 17 of Yasukawa into a slight conductor. The difference of whether a certain material comprises a slight conductor or an insulator depends upon the specific design and the location of the layer within the specific design. Therefore, at one location a layer having a resistivity of 10^9 ohms-cm could function as an insulator, while the same layer could function as a slight conductor in a different structure. The important feature to be understood is that in its specific location, within a narrow resistivity range, a specific layer could act as a slight conductor or an insulator. In the claimed invention, the layer clearly comprises a slight conductive layer, while in Grinberg the layer is clearly described as an insulator. Therefore, no motivation is provided to one ordinarily skilled in the art to change insulator 17 in Yasukawa into a slight conductor. Thus, it is Applicant's position that the proposed combination of references does not teach or suggest the claimed invention. The claims clearly and unambiguously define a layer that "provides a level of conductivity corresponding to a resistivity between 10^4 and 10^{11} ohms-cm " To the contrary, Yasukawa discloses a passivating layer 17, nothing more and this is not modified by the teachings of Grinberg. Therefore, Yasukawa, even if combined with Grinberg, does not teach or suggest the claimed invention. Therefore, the proposed combination of references does not teach or suggest the invention as defined by independent claims 1, 3, 15, or 17 and these independent claims are patentable over Yasukawa. Further, dependent claims 2, 5, 7, 16, and 19 are similarly patentable. In view of the foregoing, the Examiner is respectfully requested to reconsider and withdraw this rejection.

B. The Rejection Based on Yasukawa and Grinberg in view of Howe

As shown above, the proposed combination of Yasukawa and Grinberg does not teach or suggest the claimed layer that "provides a level of conductivity corresponding to a resistivity between 10^4 and 10^{11} ohms-cm" as defined by independent claims eight and 10. Howe is non-analogous art and is utilized to teach a carbon-containing layer. However, Howe does not teach or suggest any features relating to a liquid crystal displays and cannot be utilized to teach or suggest the specific carbon-containing layer that is defined in the claims to have a specific resistivity, and which is positioned as in the

claimed invention. This is especially true considering that the primary reference Yasukawa teaches away from the invention by requiring the use of an insulator where the invention utilizes a layer having slightly conductive properties.

Therefore, Applicants submit that neither Grinberg nor Howe can modify Yasukawa so as to arrive at the claimed invention. More specifically, the combination of references cannot be said to teach or suggest a layer that "provides a level of conductivity corresponding to a resistivity between 10^4 and 10^{11} ohms-cm." Therefore, Yasukawa, even if combined with Grinberg and Howe, does not teach or suggest the claimed invention. Therefore, the proposed combination of references does not teach or suggest the invention as defined by independent claims 8 and 10 and these independent claims are patentable over Yasukawa. Further, dependent claims 9, 12, and 14 are similarly patentable. In view of the foregoing, the Examiner is respectfully requested to reconsider and withdraw this rejection.

C. The Rejection Based on Yasukawa, Grinberg, and Howe in view of Hanihara

Hanihara does not cure the deficiency of the combination of Yasukawa, Grinberg, and Howe, shown above. More specifically, Hanihara does not teach or suggest the carbon containing layer that "provides a level of conductivity corresponding to a resistivity between 10^4 and 10^{11} ohms-cm" as defined by independent claims 1, 8, and 15. Indeed, Hanihara is only referenced for showing that silicon oxide has a unidirectional orientation matched to the liquid crystal material and is not intended to teach or suggest a diamond-like conductive amorphous layer. Therefore, any combination of Hanihara and Yasukawa, Grinberg, and Howe would not teach or suggest the carbon containing layer that "provides a level of conductivity corresponding to a resistivity between 10^4 and 10^{11} ohms-cm" as defined by independent claims 1, 8, and 15. Therefore, independent claims 1, 8, and 15 are patentable over any combination of Yasukawa Grinberg, Howe, and Hanihara. Further, dependent claims 4, 11, and 18 are similarly patentable, not only by virtue of their dependency from a patentable independent claim, but also by virtue of

the additional features of the invention they define. In view of the forgoing, the Examiner is respectfully requested to reconsider and withdraw this rejection.

D. The Rejection Based on Yasukawa, Grinberg, and Howe in view of APA(Lu)

Neither the APA nor the previously discussed Yasukawa, Grinberg, or Howe teach or suggest the carbon containing layer that "provides a level of conductivity corresponding to a resistivity between 10^4 and 10^{11} ohms-cm" as defined by independent claims 1, 8, and 15. The APA (Figure 1, page 2, line 18-page 3, line 10 of the specification) teaches that when a voltage below a threshold voltage is applied to the gate line 107, the transistor 109 is in an off condition so that the potential on the data bus line 108 and electrode 106 are isolated from one another. When a voltage larger than the threshold voltage is applied on the gate bus line 107, the transistor 109 is in an on condition (low impedance state), thereby allowing the voltage on the data bus line 108 to charge the electrode 106. Varying the voltage to the electrode 106 controls the liquid crystal cell 111 such that different amounts of light are transmitted across the liquid crystal display, thus resulting in the display of a gray scale of light. A reflective type AMLCD is similar in structure to the transmissive type AMLCD; however, the transparent electrode 106 is usually replaced with a reflective metal electrode which generally occupies a larger area to cover the transistor 109.

As shown above, the claimed invention is fundamentally different than any of the teachings in the prior art. The invention avoids flicker LCD problems by using a slightly conducting thin film, e.g., diamond like carbon (DLC) film, coated on both the Al and ITO electrodes of reflective LCDs to reduce and stabilize the Vcom shift. The slightly conducting film allows electrical charges to flow toward the electrodes and bend the Fermi level of the adjacent electrode and balance the surface potential. Thus, with the invention, the Vcom shift is small and stable so that the display can be operated in the frame inversion drive with a frame rate lower than 70 Hz without perceivable flicker. Such features are simply not taught or suggested by the prior art of record.

More specifically, none of the applied references teaches or suggests the carbon containing layer that provides a level of conductivity corresponding to a resistivity between 10^4 and 10^{11} ohms-cm" as defined by independent claims 1, 8, and 15. Therefore, independent claims 1, 8, and 15 are patentable over any combination of Yasukawa, Grinberg, Howe, and the APA. Dependent claims 6, 13, and 20 define that the voltage between the first-type and reflective electrodes controls the transparency of the liquid crystal material. As shown above, Yasukawa is deficient in teaching that the carbon containing layer that "provides a level of conductivity corresponding to a resistivity between 10^4 and 10^{11} ohms-cm" as defined by independent claims 1, 8, and 15. Contrary to such slightly conductive layers, the prior art actually teaches a passivating layer. Therefore, Applicant's submit that the prior art of record does not teach or suggest using such a conductive amorphous layer to control the transparency of the liquid crystal material as defined by dependent claims 6, 13, and 20. Therefore, dependent claims 6, 13, and 20 are patentable over the prior art of record. The concept of using a slightly conducting amorphous layer to control the transparency of the liquid crystal material is a concept that is independently patentable. In view of the foregoing, the Examiner is respectfully requested to reconsider and withdraw this rejection.

III. Formal Matters and Conclusion

In view of the foregoing, Applicants submit that claims 1-20, all the claims presently pending in the application, are patentably distinct from the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary.

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Please charge any deficiencies and credit any overpayments to Attorney's Deposit Account Number 50-0510.

Respectfully submitted,

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